ENGLISH LANGUAGE AND COMPOSITION

SECTION II

Total time—2 hours and 15 minutes

3 Questions

Question 1

Suggested reading and writing time—55 minutes

It is suggested that you spend 15 minutes reading the question, analyzing and evaluating the sources, and 40 minutes writing your response.

Note: You may begin writing your response before the reading period is over.

(This question counts as one-third of the total essay section score.)

Vertical farms are indoor agricultural facilities in which plants are grown, often in a hydroponic (soilless) environment, on tall stacks of shelves. Plants are given water, nutrients, and light mostly through automated processes. Advocates say that vertical farms are key to providing food for the future, yielding high-quality produce while making efficient use of land and water. Critics warn about the energy consumption associated with vertical farms' automated processes as well as problems related to cost and nutritional value.

Carefully read the following six sources, including the introductory information for each source. Write an essay that synthesizes material from at least three of the sources and develops your position on the value, if any, of vertical farms to the future of agriculture.

Source A (Severson article)
Source B (Ling and Altland interview)
Source C (table from Kozai and Niu)
Source D (Foley article)
Source E (Benke and Tomkins article)
Source F (graphic from Despommier)

In your response you should do the following:

- Respond to the prompt with a thesis that presents a defensible position.
- Select and use evidence from at least three of the provided sources to support your line of reasoning. Indicate clearly the sources used through direct quotation, paraphrase, or summary. Sources may be cited as Source A, Source B, etc., or by using the description in parentheses.
- Explain how the evidence supports your line of reasoning.
- Use appropriate grammar and punctuation in communicating your argument.

GO ON TO THE NEXT PAGE.

Source A

Severson, Kim. "No Soil. No Growing Seasons. Just Add Water and Technology." *The New York Times*, 6 July 2021, www.nytimes.com/2021/07/06/dining/hydroponic-farming.html.

The following is excerpted from an online article published in a national American newspaper.

[A] high-tech greenhouse so large it could cover 50 football fields glows with the pinks and yellows of 30,600 LED and high-pressure sodium lights.

Inside, without a teaspoon of soil, nearly 3 million pounds of beefsteak tomatoes grow on 45-feet-high vines whose roots are bathed in nutrient-enhanced rainwater. Other vines hold thousands of small, juicy snacking tomatoes with enough tang to impress Martha Stewart,[1] who is on the board of AppHarvest, a start-up that harvested its first crop here in January and plans to open 11 more indoor farms in Appalachia by 2025.

In a much more industrial setting near the Hackensack River in Kearny, N.J., trays filled with sweet baby butterhead lettuce and sorrel that tastes of lemon and green apple are stacked high in a windowless warehouse—what is known as a vertical farm. Bowery, the largest vertical-farming company in the United States, manipulates light, humidity, temperature and other conditions to grow produce, bankrolled by investors like Justin Timberlake, Natalie Portman, and the chefs José Andrés and Tom Colicchio.

"Once I tasted the arugula, I was sold," said Mr. Colicchio, who for years rolled his eyes at people who claimed to grow delicious hydroponic produce. "It was so spicy and so vibrant, it just blew me away."

The two operations are part of a new generation of hydroponic farms that create precise growing conditions using technological advances like machine-learning algorithms, data analytics and proprietary software systems to coax customized flavors and textures from fruits and vegetables. And they can do it almost anywhere.

These farms arrive at a pivotal moment, as swaths of the country wither in the heat and drought of climate change, abetted in part by certain forms of agriculture. The demand for locally grown food has never been stronger, and the pandemic has shown many people that the food supply chain isn't as resilient as they thought. . . .

"We've perfected mother nature indoors through that perfect combination of science and technology married with farming," said Daniel Malechuk, the chief executive of Kalera, a company that sells whole lettuces, with the roots intact, in plastic clamshells for about the same price as other prewashed lettuce. In March, the company opened a 77,000-square-foot facility south of Atlanta that can produce more than 10 million heads of lettuce a year. . . .

Although the nutritional profile of hydroponic produce continues to improve, no one yet knows what kind of long-term health impact fruits and vegetables grown without soil will have. No matter how many nutrients indoor farmers put into the water, critics insist that indoor farms can never match the taste and nutritional value, or provide the environmental advantages, that come from the marriage of sun, a healthy soil microbiome and plant biology found on well-run organic farms.

"What will the health outcomes be in two generations?" Mr. Chapman [Dave Chapman, a Vermont farmer and the executive director of the Real Organic Project] asked. "It's a huge live experiment, and we are the rats."

[1] businesswoman and television presenter whose work focuses on crafts, recipes, and home goods

Source B

Ling, Kai-Shu, and James Altland. Interview by Georgia Jiang. "Vertical Farming—No Longer a Futuristic Concept." *Under the Microscope: Zooming in on Agriculture's Biggest Challenges*, Agricultural Research Service, United States Department of Agriculture, 27 Jan. 2022, www.ars.usda.gov/oc/utm/vertical-farming-no-longer-a-futuristic-concept.

The following is excerpted from an interview with Kai-Shu Ling, a research plant pathologist, and James Altland, a research horticulturalist. The interview is one of the "Under the Microscope" series of monthly interviews published online by the Agricultural Research Service [ARS] of the United States Department of Agriculture [USDA].

UM [Under the Microscope Interviewer]—What are the advantages of vertical farming?

KL [Kai-Shu Ling]: Vertical farming offers many benefits that traditional farming cannot. For example, while the crops produced by traditional farming are limited by geographic region and seasonal changes, vertical farming allows growers to grow regional or seasonal crops indoors year-round. They can grow crops anywhere a greenhouse or controlled environment can be established. As a result, consumers (especially those in urban areas typically far from traditional farmlands) can also have easier access to fresher produce.

We're currently repurposing ship containers to become vertical farming research units. Although vertical farming's high costs can often be discouraging, shipping containers and abandoned warehouses are readily available and relatively inexpensive. Converting them into vertical farming environments not only breathes life back into discarded infrastructure but also puts fresh produce in parking lots and urban centers.

JA [James Altland]: Vertical farming also uses much less land. For some crops, 10 to 20 times the yield can be obtained per acre in vertical farming compared to open-field crops. Other advantages are that vertical farms are in enclosed structures, so not subject to extreme or inclement weather. Vertical farms are being built in deserts, high-population urban areas, and other places that traditional open-field farming is not practical.

UM—What are the limitations to this type of farming? What is ARS doing to overcome these challenges?

JA: The major disadvantage is that you give up access to the Sun, which is [the] most abundant (and free) source of energy on Earth. Growing plants vertically in stacked systems often requires artificial light sources, which can become costly. Vertical farming also requires humidity control through expensive and energy-intensive heating, ventilation, and air conditioning (HVAC) systems. . . .

UM—What crops are best grown through vertical farming? Which crops are better suited for traditional farming?

JA: Currently, lettuce and other leafy greens are the most popular crops for vertical farming. While research is underway to grow all types of crops in vertical farms, the most successful ones today would be those that can be grown hydroponically, have relatively short compact growth forms, and can be harvested in their entirety. For example, lettuce can be harvested in its whole form, as opposed to corn where only the cob is harvested for sale and the rest must be disposed of some other way.

KL: We're currently investigating the vertical farming potential of small fruits (e.g., strawberries) and fruiting vegetables (e.g., tomato, pepper). . . . Cereal and row crops (e.g., corn, rice, wheat and soybeans) are still better

GO ON TO THE NEXT PAGE.

suited for traditional farming. . . .

UM—I understand that vertical farming has launched into space. What are you hoping to accomplish with this effort?

JA: NASA is keenly interested in CEA [controlled environment agriculture] for its use on long-term manned space missions.

KL: Agreed. NASA is a pioneer in research on crop production under controlled environment. NASA continues to improve the technologies for growing vegetables and fruits in space for future Moon and Mars explorations. USDA has a long history of collaboration with NASA on controlled environment agriculture research.

GO ON TO THE NEXT PAGE.

Source C

Kozai, Toyoki, and Genhua Niu. "Role of the Plant Factory with Artificial Lighting (PFAL) in Urban Areas." *Plant Factory: An Indoor Vertical Farming System for Efficient Quality Food Production,* edited by Toyoki Kozai et al., Elsevier, 2016, pp. 7–32.

The following is adapted from a table published in a book on vertical farming.

Classification of Four Types of Plant Production Systems by Their Relative Stability and Controllability, and Other Factors

Stability and Controllability	Open Fields	Greenhouse: Soil Culture	Greenhouse: Hydroponics	Vertical Farms
Natural stability of aerial zone	Very low	Low	Low	Low
Artificial controllability of aerial zone	Very low	Medium	Medium	Very high
Natural stability of root zone	High	High	Low	Low
Artificial controllability of root zone	Low	Low	High	High
Vulnerability of yield and quality	High	Medium	Relatively low	Low
Initial investment per unit land area	Low	Medium	Relatively high	Extremely high
Yield	Low	Medium	Relatively high	Extremely high

Note: "Aerial zone" refers to weather in the "Open Fields" category; "root zone" refers to soil environment.

GO ON TO THE NEXT PAGE.

Source D

Foley, Jonathan. "No, Vertical Farms Won't Feed the World." *GlobalEcoGuy*, 1 Aug. 2018, globalecoguy.org/no-vertical-farms-wont-feed-the-world-5313e3e961c0.

The following is excerpted from an article published online by an environmental scientist and sustainability expert.

[T]here are costs to these [vertical] farms. *Huge* costs.

First, these systems are *really* expensive to build. The shipping container systems developed by [container farming technology company] Freight Farms, for example, cost between $82,000 and $85,000 *per container*—an astonishing sum for a box that just grows greens and herbs. Just one container costs as much as 10 entire acres of prime American farmland—which is a far better investment, both in terms of food production and future economic value. Just remember: farmland has the benefit of generally *appreciating* in value over time, whereas a big metal box is likely to only decrease in value.

Second, food produced this way is *very* expensive. For example, the *Wall Street Journal* reports that mini-lettuces grown by Green Line Growers cost more than *twice* as much as organic lettuce available in most stores. And this is typical for other indoor growers around the country: it's very, very expensive, even compared to organic food. Instead of making food *more* available, especially to poorer families on limited budgets, these indoor crops are only available to the affluent. It might be fine for gourmet lettuce, or fancy greens for expensive restaurants, but regular folks may find it out of reach.

Finally, indoor farms use *a lot* of energy and materials to operate. The container farms from Freight Farms, for example, use about 80 kilowatt-hours of electricity a day to power the lights and pumps. That's nearly 2–3 times as much electricity as a typical (and still very inefficient) American home, or about 8 times the electricity used by an average San Francisco apartment. And on the average American electrical grid, this translates to emitting *44,000 pounds of CO2 per container per year*, from electricity alone, not counting any additional heating costs. This is *vastly* more than the emissions it would take to ship the food from someplace else.

And none of it is necessary.

But, Wait, Can't Indoor Farms Use Renewable Energy?

Proponents of indoor techno-farms often say that they can offset the enormous sums of electricity they use, by powering them with renewable energy—especially solar panels—to make the whole thing carbon neutral.

But just stop and think about this for a second.

These indoor "farms" would use solar panels to harvest naturally occurring sunlight, and convert it into electricity, so that they can power . . . *artificial sunlight*? In other words, they're *trying to use the sun to replace the sun*.

But we don't need to replace the sun. Of all of the things we should worry about in agriculture, the availability of free sunlight is not one of them. Any system that seeks to replace the sun to grow food is probably a bad idea.

Source E

Benke, Kurt, and Bruce Tomkins. "Future Food-Production Systems: Vertical Farming and Controlled-Environment Agriculture." *Sustainability: Science, Practice and Policy*, vol. 13, no. 1, Nov. 2017, pp. 13-26, www.tandfonline.com/doi/full/10.1080/15487733.2017.1394054.

The following is excerpted from a research article in an online interdisciplinary journal that focuses on sustainability-related topics.

The vertical farming model was proposed with the aim of increasing the amount of agricultural land by 'building upwards.' In other words, the effective arable [1] area for crops can be increased by constructing a high-rise building with many levels on the same footprint of land (Despommier 2010; The Economist 2010). One approach is to employ a single tall glasshouse design with many racks of crops stacked vertically. It is an extension of the greenhouse hydroponic farming model and addresses problems relating to the use of soils, such as the requirement for herbicides, pesticides, and fertilizers. . . .

Clean, green, and gourmet (CGG) food

The possibility of CGG food production is easily the most attractive feature of the vertical farming model. This aspect is less price sensitive to affluent consumers in high-demand countries such as China. All-year-round crop production without seasonality, in a climate-controlled environment (including both temperature and humidity), will produce fresh produce virtually on demand. There would be no weather-related crop failures due to drought or flooding if hydroponic and aeroponic technologies are employed.

Using recycled water and nutrients in a closed, indoor, climate-controlled environment adds to food security and can reduce or even completely eliminate the need for pesticides and herbicides. Contamination by pathogens or heavy metals will no longer be an issue as occurs in rural farming. There is scope for marketing the product in this respect. Strict hygienic practices must still be observed to minimize the risk of introduction of pathogens and biological contamination into the growing space. However, in a vertical farming situation, one can closely monitor the crop for signs of pest or disease both manually and automatically using sensing technologies. This mode of cultivation is very well suited to adopting new and emerging robotic technologies as well as remote-sensing procedures. This means that outbreaks are detected early to enable diseased and infested plants to be identified and disposed of appropriately. Any residual contamination can be cleaned up when the crop is harvested using strict hygienic practices.

One possible obstacle to vertical farming is that some consumers may regard the products as 'Frankenfoods,' as discovered by managers of a giant underground farm supplying London's restaurants (Curtis 2016) and another business that supplies between 8% and 12% of the British output of tomatoes, peppers, and cucumbers (Fletcher 2013). For this reason, some enterprises may not publicize growing conditions for fear of alienating consumers and destabilizing sales potential. To minimize this issue, it can be stressed that growing conditions are not different from existing hydroponic facilities with respect to germplasm, [2] nutrition, and other cultural

GO ON TO THE NEXT PAGE.

and production practices. Furthermore, the plants are derived from natural breeding programs with normal nutrients supplied. There is an advantage that plants are grown in a hygienic environment with reduced need for pesticides and are in a closed system so there is no environmental pollution from nitrogen leaching or run-off.

[1] suitable for growing crops

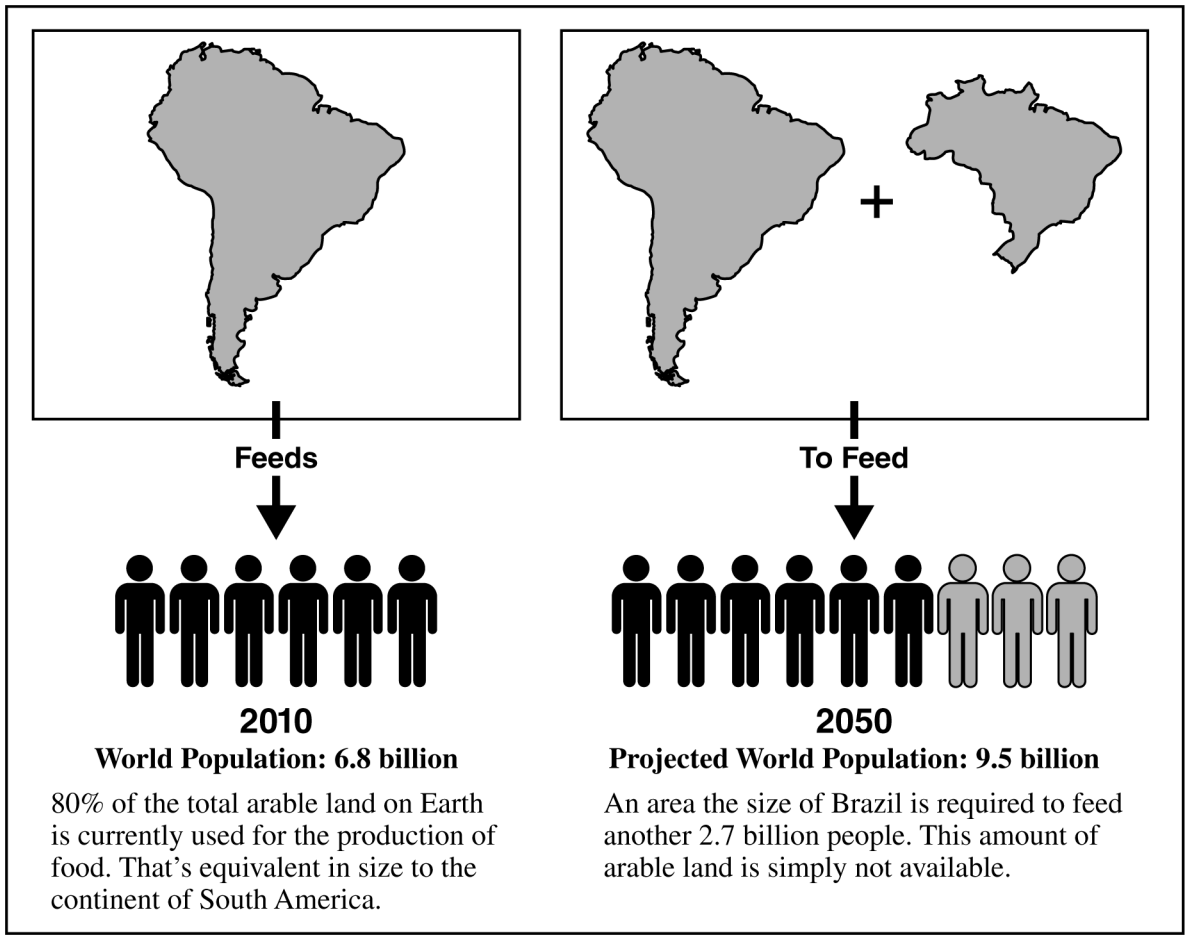
[2] living plant tissue used to generate other plants

GO ON TO THE NEXT PAGE.

Source F

Despommier, Dickson D. *The Vertical Farm: Feeding the World in the 21st Century*. Thomas Dunne / St. Martin's, 2010.

The following is adapted from a graphic published in a book about vertical farming.



Note: Arable land is land that is used or suitable for growing crops.

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

GO ON TO THE NEXT PAGE.

Synthesis Essay — 6 points

Vertical farms are indoor agricultural facilities in which plants are grown, often in a hydroponic (soilless) environment, on tall stacks of shelves. Plants are given water, nutrients, and light mostly through automated processes. Advocates say that vertical farms are key to providing food for the future, yielding high-quality produce while making efficient use of land and water. Critics warn about the energy consumption associated with vertical farms' automated processes as well as problems related to cost and nutritional value.

Carefully read the following six sources, including the introductory information for each source. Write an essay that synthesizes material from at least three of the sources and develops your position on the value, if any, of vertical farms to the future of agriculture.

Source A (Severson article)
Source B (Ling and Altland interview)
Source C (table from Kozai and Niu)
Source D (Foley article)
Source E (Benke and Tomkins article)
Source F (graphic from Despommier)

In your response you should do the following:

- Respond to the prompt with a thesis that presents a defensible position.
- Select and use evidence from at least three of the provided sources to support your line of reasoning. Indicate clearly the sources used through direct quotation, paraphrase, or summary. Sources may be cited as Source A, Source B, etc., or by using the description in parentheses.
- Explain how the evidence supports your line of reasoning.
- Use appropriate grammar and punctuation in communicating your argument.

<table>
<tr><th>Reporting Category</th><th colspan="2">Scoring Criteria</th></tr>
<tr><td rowspan="5">Row A
Thesis
(0–1 points)</td><td>0 points
For any of the following:
• There is no defensible thesis.
• The intended thesis only restates the prompt.
• The intended thesis provides a summary of the issue with no apparent or coherent claim.
• There is a thesis, but it does not respond to the prompt.</td><td>1 point
Responds to the prompt with a thesis that presents a defensible position.</td></tr>
<tr><td colspan="2">Decision Rules and Scoring Notes</td></tr>
<tr><td>Responses that do not earn this point:
• Only restate the prompt.
• Do not take a position, or the position is vague or must be inferred.
• Equivocate or summarize others' arguments but not the student's (e.g., some people say it's good, some people say it's bad).
• State an obvious fact rather than making a claim that requires a defense.</td><td>Responses that earn this point:
• Respond to the prompt by developing a position on the value, if any, of vertical farms to the future of agriculture, rather than restating or rephrasing the prompt. Clearly take a position rather than just stating there are pros/cons.</td></tr>
<tr><td>Examples that do not earn this point:
Restate the prompt
• "Proponents of vertical farms argue that they are the key to providing food in the future, while critics warn about the cost and energy consumption of vertical farms."
Address the topic of the prompt but do not take a position
• "Vertical farms, or indoor farms where food is grown in tall towers, have been touted as a way to address potential food shortages in our growing global population."
Address the topic of the prompt but state an obvious fact as a claim
• "If the world's population continues to grow at its current rate, we will eventually run out of arable land to grow enough food for everyone."</td><td>Examples that earn this point:
Present a defensible position that responds to the prompt
• "With the amount of farmland diminishing across the globe, vertical farms are the future of agriculture."
• "Although vertical farms may seem like a viable solution for providing food for our growing population, important factors such as cost and energy consumption prevent it from being a fully sustainable model of agriculture."
• "Because vertical farming still has some drawbacks, it should not replace traditional agricultural methods. However, vertical farming can be a good supplemental or alternative method of farming, especially in urban areas where farmland is scarce."</td></tr>
<tr><td colspan="2">Additional Notes:
• The thesis may be more than one sentence, provided the sentences are in close proximity.
• The thesis may be anywhere within the response.
• For a thesis to be defensible, the sources must include at least minimal evidence that could be used to support that thesis; however, the student need not cite that evidence to earn the thesis point.
• The thesis may establish a line of reasoning that structures the essay, but it needn't do so to earn the thesis point.
• A thesis that meets the criteria can be awarded the point whether or not the rest of the response successfully supports that line of reasoning.</td></tr>
</table>

Reporting Category	Scoring Criteria				
Row B Evidence AND Commentary (0–4 points)	**0 points** Simply restates thesis (if present), repeats provided information, or references fewer than two of the provided sources.	**1 point** EVIDENCE: Provides evidence from or references at least two of the provided sources. AND COMMENTARY: Summarizes the evidence but does not explain how the evidence supports the student's argument.	**2 points** EVIDENCE: Provides evidence from or references at least three of the provided sources. AND COMMENTARY: Explains how some of the evidence relates to the student's argument, but no line of reasoning is established, or the line of reasoning is faulty.	**3 points** EVIDENCE: Provides specific evidence from at least three of the provided sources to support all claims in a line of reasoning. AND COMMENTARY: Explains how some of the evidence supports a line of reasoning.	**4 points** EVIDENCE: Provides specific evidence from at least three of the provided sources to support all claims in a line of reasoning. AND COMMENTARY: Consistently explains how the evidence supports a line of reasoning.
	Decision Rules and Scoring Notes				
	Typical responses that earn 0 points: • Are incoherent or do not address the prompt. • May be just opinion with no textual references or references that are irrelevant.	**Typical responses that earn 1 point:** • Tend to focus on summary or description of sources rather than specific details.	**Typical responses that earn 2 points:** • Consist of a mix of specific evidence and broad generalities. • May contain some simplistic, inaccurate, or repetitive explanations that don't strengthen the argument. • May make one point well but either do not make multiple supporting claims or do not adequately support more than one claim. • Do not explain the connections or progression between the student's claims, so a line of reasoning is not clearly established.	**Typical responses that earn 3 points:** • Uniformly offer evidence to support claims. • Focus on the importance of specific words and details from the sources to build an argument. • Organize an argument as a line of reasoning composed of multiple supporting claims. • Commentary may fail to integrate some evidence or fail to support a key claim.	**Typical responses that earn 4 points:** • Uniformly offer evidence to support claims. • Focus on the importance of specific words and details from the sources to build an argument. • Organize and support an argument as a line of reasoning composed of multiple supporting claims, each with adequate evidence that is clearly explained.
	Additional Notes: • Writing that suffers from grammatical and/or mechanical errors that interfere with communication cannot earn the fourth point in this row.				

<table>
<tr><th>Reporting Category</th><th colspan="2">Scoring Criteria</th></tr>
<tr><td rowspan="4">Row C
Sophistication
(0–1 points)</td><td>0 points
Does not meet the criteria for one point.</td><td>1 point
Demonstrates sophistication of thought and/or a complex understanding of the rhetorical situation.</td></tr>
<tr><td colspan="2">Decision Rules and Scoring Notes</td></tr>
<tr><td>Responses that do not earn this point:
• Attempt to contextualize their argument, but such attempts consist predominantly of sweeping generalizations (“In a world where . . .” OR “Since the beginning of time . . .”).
• Only hint at or suggest other arguments (“While some may argue that . . .” OR “Some people say . . .”).
• Use complicated or complex sentences or language that is ineffective because it does not enhance the argument.</td><td>Responses that earn this point may demonstrate sophistication of thought and/or a complex understanding of the rhetorical situation by doing any of the following:
1. Crafting a nuanced argument by consistently identifying and exploring complexities or tensions across the sources.
2. Articulating the implications or limitations of an argument (either the student’s argument or arguments conveyed in the sources) by situating it within a broader context.
3. Making effective rhetorical choices that consistently strengthen the force and impact of the student’s argument throughout the response.
4. Employing a style that is consistently vivid and persuasive.</td></tr>
<tr><td colspan="2">Additional Notes:
• This point should be awarded only if the sophistication of thought or complex understanding is part of the student’s argument, not merely a phrase or reference.</td></tr>
</table>

Sample 1A (1 of 2)

Important: Completely fill in the circle that corresponds to the question you are answering on this page.

Question 1 ● Question 2 ○ Question 3 ○

Begin your response to each question at the top of a new page. Do not skip lines.

While many would like to belive that vertical farms are the future of produce due to their adaptobility and modernity, in reality those systems are overvalued and only neccesary for very niche applications. Vertical farms are greenhouses where produce is grown stacked in rows without the use of soil and with complex technology that emulates the perfect growing conditions for said product.

This sounds like a great idea in practice, fresh produce year round grown efficiently, the reality is very different. Vertical farms are expensive - both in initial and operating costs. Source C reveals that vertical farms have extremely high initial investment per unit land area compared to fields, greenhouses, and hydroponic systems and Source D gives us the exact cost of over 80 thousand dollars per container from industry leader freight farms With an initial investment so large it would easily be more profitable and efficient to simply buy land to cultivate. These costs alone make it unreasonable to implement in low income areas where acess to local produce is needed the most. Until vertical farms can decrease costs to build and operate they are simply out of reach for most communities. Operating cost will most likely struggle to lower. Because there is no soil or sunlight, a large amount of power is required to support these crops which is strange because the sun is not a competetive resource or non-renewable. These costs are simply unnecarry and create problem other methods have solutions to.

The vertical farm has seen initial success despite its disadvantages when compared to other systems because of its gimicky

Use a pen with black or dark blue ink only. Do NOT write your name. Do NOT write outside the box.

Important: Completely fill in the circle that corresponds to the question you are answering on this page.

Question 1 ● Question 2 ○ Question 3 ○

Begin your response to each question at the top of a new page. Do not skip lines.

marketing. Brand owners have marketed vertical farms as pseudo-eco friendly and high tech food of the future. Source A, a New York Times article marketing vertical farm produce, goes into depth on the famous people investing in vertical farming, dropping names like Justin Timberlake and Natalie Portman to build hype. What do RnB singers and actors know about the efficacy of modern farming? Little to nothing. That didn't stop the Times from including celebrity testimonials. The food produced using vertical farming is marketed to the upper class (people who would consider the opinion of Natalie Portman in their grocery shopping) because they are the only ones who can afford it. Source D again provides numbers, showing products like the lettuce from Green Line Growers costs more than double the market price of organic lettuce. Vertical farms should not be taken seriously as the future of agriculture, especially when it treats itself as the new fresh food fad to woo the wealthy. We can support and modernize agriculture with better distribution of resources to low income communities and by working to eliminate food waste which could also be given to people in need. We already have the production and resources to support our population as long as we allocate those resources effectively.

Important: Completely fill in the circle that corresponds to the question you are answering on this page.

Question 1 ● Question 2 ○ Question 3 ○

Begin your response to each question at the top of a new page. Do not skip lines.

Vertical farms are indoor agricultural facilities that grow plants without soil. This type of farming is being employed by more and more corporations. I agree that vertical farms are key to providing ~~food~~ food for the future since it is very convenient for farmers to grow and very friendly to the planet since there would not be enough arable land for the future generations.

Vertical farms can be built everywhere. They can be built in "deserts, high-population urban areas, and other places that traditional open-field farming is not practical." (Source B). Imagine living in New York, one of the most crowded cities in the world. You can only get vegetables from small shops that you don't even know where your food came from. If we build vertical farms in abandoned parking lots, you can not only have access to organic, fresh vegetables, but also contribute to re-using land to save the planet. It's the same thing for deserts, where typically only meat is available, and a vertical farm would help the people to stay healthy and have balanced ~~nutrition~~ nutrients for each meal. Moreover, the plants grown in vertical farms taste very similarly to the plants grown on soil. Mr. Colicchio, a chef who uses hundreds of pounds of vegetables a day, said that "[hydroponic] foo] just blew [him] away" for its juiciness (Source A). If plants grown in a more eco-friendly environment tastes the same as traditionally-grown plants, why don't we employ vertical farming to contribute to a ~~more~~ more world with better ~~environ~~ environment? Vertical farms should be used because it is more convenient and mimics the original plants very well.

Important: Completely fill in the circle that corresponds to the question you are answering on this page.

Question 1 ● Question 2 ○ Question 3 ○

Begin your response to each question at the top of a new page. Do not skip lines.

Vertical farms are also helpful in limited conditions. Many of traditional ~~farmings~~ are limited by "geographic region and seasonal changes", but ~~vertical~~ farms are available year-round (source B). If we have daily vegetables, such as lettuce and spinach, available in grocery stores everyday, we would spend a lot of money on them than the less ~~usa~~ usually vegetables. Thus, the farms can have more profit and the consumers can have more fresh vegetables, ~~wich~~ which is good for both of us. Furthermore, as the ~~m~~ world's population continues to grow, more and more land would be necessary to grow plants and feed the people. That means there ~~not~~ would be less and less arable space and food might one day be luxury for ~~s~~ some people. That's when vertical farms are useful again. In source F, a projected world population of 9.5 billion needs the size of ~~th~~ South Africa and Brazil combined to ~~be~~ be fed. But that's impossible. Vertical farms can solve the problem by ~~proving~~ providing more arable land to grow plants. That way, our future generation would not have to worry out getting food everyday. It is very useful for the vertical farms to be used in limited conditions and for future generations.

Some might say that vertical farming is very costly. It is untrue because "shipping containers and abandoned warehouses are readily available and relatively inexpensive" (source B). If we have the materials and space ~~to~~ to build vertical farms, then it would not be an expensive style of farming anymore.

Since vertical farms are convenient and very helpful in limited conditions, we should employ it more to create an eco-friendly environment.

Use a pen with black or dark blue ink only. Do NOT write your name. Do NOT write outside the box.

0315131

Q5363/03

Important: Completely fill in the circle that corresponds to the question you are answering on this page.

Question 1 ● Question 2 ○ Question 3 ○

Begin your response to each question at the top of a new page. Do not skip lines.

Vertical farming will not only support us with year-round crops, it also do it for the future generations to come. Theere are many admirable quantities in our tradicional ways of farming, yet vertical farms grant other valuable benefits that tradicional farming does not.

In the article of "Future Food-Production Systems: Vertical Farming and Controlled-Environment", focuses on the real stability of vertical farmings. Benke, Kurt, and Bruce Tonkins state how not only will these new models increase the agricultural factories it will also make an asset of climate controled environments. since these Vertical farms are being proposed on the soul fact that they will benefit us in the sense of most free land, and easier consumsion people are challenging these areas the most. This article remarks how these future crops will fail to obtain their "natural breeding nutrients," but fail to voice how many world wide agricultoring land are dying from the lack of useful soil.

Use a pen with black or dark blue ink only. Do NOT write your name. Do NOT write outside the box.

Important: Completely fill in the circle that corresponds to the question you are answering on this page.

Question 1 ● Question 2 ○ Question 3 ○

Begin your response to each question at the top of a new page. Do not skip lines.

On the following Interview a plant pathologist, (Kai-Shu ling) and an research horticulturalist (James Altland), explained and expanded their viewings on this new Vertical farming. When asked a four advantage that Vertical farming offers, Kai-Shu ling states how they unlike our tradicional farming can be supported with year-round crops. In this Interview these specialist add the cheer advantages that they will aquire us with when talking about weather related obsticles. There has been many cases where years worth of farming gets removed by natural causes, such as tornadas, floodings and even strong winds. Like the graph created ~~if we were to stick with our normal farming techniques~~ by the "Role of the plant factory with Artificial lighting" they show the stability focusing on the "Aerial zone" which refers to the very high posibility of safe farming no matter of the weather in that particular zone located.

Use a pen with black or dark blue ink only. Do NOT write your name. Do NOT write outside the box.

0038682

Q5363/03

Important: Completely fill in the circle that corresponds to the question you are answering on this page.

Question 1 ● Question 2 ○ Question 3 ○

Begin your response to each question at the top of a new page. Do not skip lines.

If we stick with our normal farming techniques not only will we fail to watch any advantages bloom society won't develope a stronger agriculture potential. In other words, if we as a society can implement obvious economic possibilities for a better turn out relating to the agricultural zone, why not explore it?

Question 1

Note: Student samples are quoted verbatim and may contain spelling and grammatical errors.

Overview

Students responding to this question were expected to read six sources on the topic of vertical farming and then write an essay that synthesized material from at least three of the sources and developed their position on the value, if any, of vertical farms to the future of agriculture. Students were expected to respond to the prompt with a thesis that takes a defensible position; use evidence from at least three provided sources to support their line of reasoning clearly, properly citing the sources; explain how the evidence supports their line of reasoning; and use appropriate grammar and punctuation in presenting their argument.

As per the Course and Exam Description, students were expected to be able to read the prompt, understand the task, use sources provided to write paragraphs that reflect their ability to establish claims and provide evidence, and demonstrate their understanding of prose and their ability to write using cogent, meaningful discourse.

Sample: 1A
Score: 1-4-1

Thesis (0–1 points): 1
The first sentence of the response is a defensible thesis that addresses the prompt: "While many would like to believe that vertical farms are the future of produce due to thier adaptability and modernity, but in reality those systems are overvalued and only necessary for very niche applications."

Evidence and Commentary (0–4 points): 4
The response establishes a line of reasoning to support the thesis and supports each claim with sufficient evidence. The first major claim, that "[v]ertical farms are expensive—both in initial and operating costs" (paragraph 2), is supported by evidence from sources C and D and by additional observations about the cost of power. The second claim, that the current success of vertical farming is based on "gimicky marketing" (paragraph 3) instead of genuine advantages, is supported with evidence from source A, which is used to show a supportive article relying on "celebrity testimonials."

The response provides specific evidence from sources C, D, and A. In paragraph 2, it includes specific details from source C, the chart comparing costs of initial investment for vertical farms to "fields, greenhouses, and hydroponic systems," tying that information to the specific cost of "over 80 thousand dollars per container" given in source D. In paragraph 3, the response incorporates specific details from source A, including the references to Justin Timberlake and Natalie Portman, along with the fact from source D that "the lettuce from Green Line Growers costs more than double the market price of organic lettuce." Although there are no direct quotes from the sources, these references do represent specific evidence.

The commentary consistently explains all the evidence the response uses. In paragraph 2, the commentary clearly explains how high operating costs make vertical farming "unreasonable to implement in low income areas where access to local produce is needed the most" and that until

Question 1 (continued)

vertical farms can find a way to decrease their costs, they are "simply out of reach for most communities." In paragraph 3, the explanation that the "food produced using vertical farming is marketed to the upper class … because they are the only ones who can afford it" explains the claim and evidence about "gimicky marketing" and connects it to the line of reasoning regarding high costs established in the previous paragraph.

Sophistication (0–1 points): 1
The response articulates the limitations of an argument (in this case, the argument in Source A) by situating it in a broader context. It goes beyond a cursory examination of potential bias in a source and focuses on the broader context revealed by that bias: celebrity endorsements were not chosen randomly as a marketing ploy, but because people "who would consider the opinion of Natalie Portman in thier grocery shopping" are the exact market being targeted. By suggesting alternative methods to increase food production in an affordable way through "better distribution of resources to low income communities" and "working to eliminate food waste," the response once again articulates a broader context of limited access to fresh, healthy food while identifying other potential solutions to the problem.

In addition, the response consistently makes effective rhetorical choices that strengthen the impact of its nuanced argument. Not only is the chosen evidence concise and accurate, but the connections within the line of reasoning are very clear. For example, paragraph 2 effectively explains the problems with high initial costs and then goes on to explain why operating costs of vertical farms will also remain much higher than those of traditional farms. Paragraph 3 keeps its focus on brand owners and marketing, creating a nuanced response to the argument presented in Source A.

Sample: 1B
Score: 1-3-0

Thesis (0–1 points): 1
The defensible thesis is found at the end of paragraph 1: "I agree that vertical farms are key to providing food for the future since it is very convenient for farmers to grow and very friendly to the planet since there would not be enough arable land for the future generations."

Evidence and Commentary (0–4 points): 3
The response develops a line of reasoning and provides specific evidence to support each claim in that line of reasoning. In paragraph 2, the claim that "[v]ertical farms can be built everywhere" is supported by direct quotes from Source B. Source A is used to support an anticipated objection that vertical farms built in suboptimal locations might not deliver food that is equivalent in taste. In paragraph 3, the claim that vertical farms are helpful in limited conditions is again supported by direct quotation from Source B and information from Source F.

The response does not consistently integrate the evidence, and it only explains how some of the evidence supports the line of reasoning. Paragraph 2 presents a strong explanation of the advantages of building vertical farms "everywhere" by explaining the implications for both urban dwellers and people who live in deserts. The reference to "abandoned parking lots" in New York City is geographically inaccurate, but it does not affect the underlying line of reasoning. However, in paragraph 3, the explanations are less complete: the idea that vertical farming will be profitable because it can provide "daily vegetables" is not fully developed. Paragraph 4 attempts to address the

Question 1 (continued)

argument that vertical farming is costly, but its quotation from Source B is not elaborated on with sufficient commentary to integrate it into the argument.

Sophistication (0–1 points): 0
In paragraph 4, the response attempts to address the implications of Source B but does not situate the argument within a broader context. Instead, it offers the oversimplified claim that "[i]f we have the materials and space to build vertical farms, then it would not be an expensive style of farming anymore." The response does not explore complexities or tensions across the sources, and the rhetorical choices are not consistently effective. Although the response shows some control of language, it does not employ a style that is consistently vivid or persuasive.

Sample: 1C
Score: 1-1-0

Thesis (0–1 points): 1
Paragraph 1 as a whole is a defensible thesis: "Vertical farming will not only support us with year-round crops, it also do it for the future generations to come. There are many admirable qualities in our tradicional ways of farming, yet vertical farms grant other valuable benefits that tradicional farming does not."

Evidence and Commentary (0–4 points): 1
The response does provide evidence in the form of direct quotes and paraphrases from three sources—E, B, and C—but summarizes or describes the evidence rather than explaining how it supports an intended argument. For example, the first sentence of paragraph 3 reads, "On the following interview a plant pathologist, (Kai-Shu ling) and an research horticulturalist (James Altland), explained and expanded their viewings on this new vertical farming." This is a description of the source's content rather than a claim. The rest of the paragraph continues to summarize the source rather than use it to build an argument.

Sophistication (0–1 points): 0
The response focuses on three sources in isolation rather than consistently exploring complexity or tensions across the sources. It does not articulate the implications or limitations of an argument, and its rhetorical choices are not consistently effective. The response also does not employ a style that is consistently vivid or persuasive.